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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/921,681	08/03/2001	Bradford A. Ritter	10015864-1	8313

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HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER
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NGUYEN, KIMBINH T

ART UNIT	PAPER NUMBER
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2671

DATE MAILED: 04/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/921,681	<b>Applicant(s)</b> RITTER, BRADFORD A.	
	<b>Examiner</b> Kimbinh T. Nguyen	<b>Art Unit</b> 2671	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

**A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.**

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 November 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 and 27-54 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-18 and 52 is/are allowed.
- 6) ☒ Claim(s) 19-51, 53, 54 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This action is responsive to amendment filed 11/17/04.
2. Claims 1-25, 27-54 are pending in the application.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 27, 29-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Wolters (6,583,790).

**Claim 27**, Wolters discloses a texture map data structure including a function (parametric texture map) comprises a plurality of texels (col. 4, lines 6-13), function evaluating at least two independent variables for defining an illumination vector (light source vector  $L_u$ ,  $L_v$ ) and two independent variables for defining a view vector ( $v_u$ ,  $v_v$ ; col. 5, lines 12-20).

**Claim 29**, Wolters teaches parametric texture map comprises a plurality of texels (col. 4, lines 6-13) and wherein parametric texture map further comprises a plurality of coefficients for each texel, plurality of coefficients defining lighting characteristics for varying views of the respective texel (col. 4, lines 6-25).

**Claims 30 and 31**, Wolters discloses calculating texel display value using the texture map data to render a 3D object by the texture map data (col. 4, lines 6-40).

**Claim 32**, Wolters discloses a texture map data structure including a function (parametric texture map) comprises a plurality of texels (col. 4, lines 6-13), function evaluating at least two independent variables for defining a half angle vector (col. 3, lines 52-53) and two independent variables for defining a difference vector (Hu, Hv; col. 5, lines 21-22).

**Claims 33-35**, the rationale provided in the rejection of claims 28, 30 and 31 are incorporated herein.

**Claims 36 and 39**, Wolters teaches using a texture map that includes a function (parametric texture map) for use in rendering a digital image having surface reflectance properties (col. 4, lines 27-40), wherein the function evaluates more than two variables directed to surface reflectance properties (four variables; see equation 2).

**Claims 37, 40**, the rationale provided in the rejection of claim 27 is incorporated herein.

**Claims 38 and 41**, Wolters teaches parametric texture map evaluates at least two independent variables for defining a half-angle vector and at least two independent variables for defining a difference vector (Hu, Hv; col. 5, lines 21-22).

**Claims 42-44**, the rationale provided in the rejection of claims 36 and 38 are incorporated herein.

***Claim Rejections - 35 USC § 103***

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5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-25, 28, 45-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolters (6,583,790) in view of Kouadio (6,765,573).

**Claim 19**, Wolters discloses a parametric texture map (parametric texture map 16) executable by the graphics processor (graphics processor 14; fig.1), wherein said parametric texture map models a surface reflectance function defining surface reflectance properties for a surface structure (col. 3, lines 48-55), Wolters does not teach the surface reflectance function comprises a Bidirectional Reflectance Distribution Function (BRDF); however, Kouadio teaches the surface reflectance function comprises a Bidirectional Reflectance Distribution Function (abstract; col. 2, lines 36-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Bidirectional Reflectance Distribution Function taught by Kouadio into the parametric texture map of Wolters for providing surface reflectance distribution function, because it would improve method for CG surface shading using a stored textured map for faster processing (col. 1, lines 14-15).

**Claims 20-22**, Wolters teaches parametric texture map comprises at least four independent variables ( $D_u$ ,  $D_v$ ,  $D_u D_v$ ,  $D_u$ ,  $D_v$ , see equation 2, col. 3, line 65 through col. 4, line 5); parametric texture map comprises at least two independent variables for defining a light direction vector for surface ( $L_u$ ,  $L_v$ ; col. 5, lines 14-21); parametric

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texture map comprises at least two independent variables for defining a view direction vector for surface reflectance properties ( $V_u$  and  $V_v$ ; col. 5, lines 12-19).

**Claim 23**, Wolters teaches parametric texture map comprises at least two independent variables for defining a half-angle vector for the surface ( $H_u$ ,  $H_v$ ; col. 5, lines 21-22).

**Claim 24**, Wolters teaches parametric texture map comprises at least two independent variables ( $u, v$ ) for defining a difference vector for surface reflectance properties (diffuse and specular contributions; col. 7, lines 14-30) .

**Claim 25**, Wolters teaches the graphic processor 14 renders the surface in real-time (bilinear, trilinear interpolations; col. 6, lines 12-25).

**Claim 28**, Kouadio discloses texture map data structure models a surface reflectance function for a surface structure (col. 4, lines 7-21). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the a surface reflectance function taught by Kouadio into the parametric texture map of Wolters for providing surface reflectance distribution function, because it would improve method for CG surface shading using a stored textured map for faster processing (col. 1, lines 14-15).

**Claim 45**, Wolters does not teach BRDF; however, Kouadio teaches texture map includes a BRDF for use in rendering a digital image (col. 4, lines 47-50), wherein the BRDF includes more than two variables relating to surface reflectance properties of the digital image (light vector  $L$ , view vector  $V$  and direction vector  $N$ ; col. 5, lines 49-65). It would have been obvious to one of ordinary skill in the art at the time the invention was

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made to incorporate the Bidirectional Reflectance Distribution Function taught by Kouadio into the parametric texture map of Wolters for providing surface reflectance distribution function, because using BRDF function it would implement the new approach with minor extensions to make it usable for texture map, gave better visual results and is faster than the traditional BRDF computation (col. 11, lines 36-39).

**Claims 46-48**, Wolters teaches more than two variables are selected from the group consisting of: variables for defining an illumination, variables for defining a view vector, variables for defining a half vector and variables for defining a difference vector (Lu, Lv, Vu, Vv, Hu, Hv; col. 5, lines 7-22).

7. Claims 49-51 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolters (6,583,790).

**Claim 49**, Wolters teaches computer executable software code (hardware, software; col. 1, lines 20-22) stored to a computer-readable medium. Wolters does not teach a computer executable software code stored to a computer-readable medium; however, Wolters teaches computer graphics system typically employs hardware, software or both to generate data values (col. 1, lines 20-22), this feature related to a computer executable software code stored to a computer-readable medium. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement a computer executable software stored in a computer-readable medium such as diskette, ROM into computer graphics system of Wolters for executing computer software code, because it would provide a system would have a lower cost and higher productivity (col. 2, lines 32-33); the software comprising: receiving at least

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four independent surface reflectance property variables (view vector  $V$ , light source vector  $L$  or half-angle vector  $H$ :  $V_u$ ,  $V_v$ ,  $L_u$ ,  $L_v$ ,  $H_u$ ,  $H_v$ ; col. 5, lines 7-22); using a function included in a texture map (parametric texture map; col. 4, lines 27-40) for rendering a digital image, wherein the function evaluates four independent surface reflectance property variables to render the digital image having proper surface reflectance properties (diffuse contribution, specular contribution; col. 8, lines 27-35).

**Claims 50, 51**, the rationale provided in the rejections of claims 43, 44 and 49 are incorporated herein.

**Claim 53**, Wolters discloses creating a parametric texture map that comprises parameters for an equation that defines a surface structure in a manner in which the appearance of the surface structure includes surface reflectance properties (col. 2, lines 54-59; col. 3, lines 48-67; equation 2); the and rendering a digital image using parametric texture map (col. 4, lines 27-40). Wolters does not teach the equation models a Bidirectional Reflectance Distribution Function (BRDF); however, Kouadio teaches the equation models a Bidirectional Reflectance Distribution Function (col. 2, lines 36-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the Bidirectional Reflectance Distribution Function taught by Kouadio into the parametric texture map of Wolters for providing surface reflectance distribution function, because it would improve method for CG surface shading using a stored textured map for faster processing (col. 1, lines 14-15).

8. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolters (6,583,790) in view of Toh (5,537,494).



**Claim 54**, Wolters teaches parametric texture map comprises a plurality of texels (col. 4, lines 6-13); parametric texture map comprises at least two independent variables for defining a view direction vector for surface reflectance properties ( $V_u$  and  $V_v$ ; col. 5, lines 12-19). Wolters does not teach performing a least squares fit algorithm to the sampled surface reflectance data. However, Toh teaches a least square fitting by numerical algorithm (col. 4, line 66 through col. 5, line 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the least squares fit algorithm taught by Toh into a bump mapping method of Wolters's teaching for proving surface reflectance to radiance environment map, because it would provide a method of encoding image data, smoothing initial image data to suppress noise and fitting a continuous equation to image intensity profile portions (col. 3, lines 13-17).

***Allowable Subject Matter***

9. Claims 1-18 and 52 allowed.

The following is an examiner's statement of reasons for allowance:

The prior art does not teach creating a parametric texture map that comprises parameters for an equation that defines a homogeneous surface structure in a manner in which the appearance of the surface structure includes surface reflectance properties, wherein said parametric texture map does not include variables representing surface position.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

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accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

***Response to Arguments***

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh T. Nguyen whose telephone number is (571) 272-7644. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Friday from 7:00 AM to 3:30 PM.

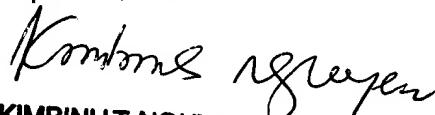
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman, can be reached at (571) 272-7653. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

April 15, 2005

  
KIMBINH T. NGUYEN  
PRIMARY EXAMINER